Long-Term Vegetation Change in the Centennial Mountains

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Abstract

There is considerable controversy over the past and current role of livestock grazing in changing the vegetative communities of the western United States. The use of repeat photographs can provide some insight into long-term changes within broad community types. An extensive search was made to locate historical photographs in the Centennial Mountains along the Idaho-Montana border. These photographs were taken to the field and modern photographs were taken to reproduce the historical scenes as close as possible. Over 100 photosets were compiled throughout the area. These photosets represented a diverse group of communities including montane grasslands, sagebrush, coniferous forests, aspen, subalpine meadows and willow communities. While it is difficult to determine species shifts within communities, these photosets suggest that the extent of conifers have increased markedly while many of the other communities have decreased. Several factors may have contributed to the shift; however, a change in the historic fire regime appears to be the leading cause of the conifer increase. Long-term livestock grazing appeared to have little impact on the willow communities or soil erosion. These photosets suggest that grasslands, sagebrush, meadow and aspen communities will continue to have conifer encroachment unless the historic fire regime is re-implemented.

Study Area

This repeat photoset study was conducted in the Centennial Mountains. These mountains run east to west for about 90 miles from Interstate 15 on the west to Henrys Lake on the east. They are one of the few east-west trending mountain ranges in North America and form the border between Idaho to the south and Montana to the north.

Methods

Historical archives were searched and individuals were contacted to obtain historical photographs.

104 repeat photosets were compiled with 9 dating to 1871 and 17 dating to the 1890s.

Most repeat photographs were taken during 1994 and 1995 but a few were taken in 1997.

Photopoints were marked on a U.S. Geological Survey 1:24,000 scale topographic map. Elevation and UTM coordinates were estimated from the topographic map.

Each photograph was visually scanned to determine the vegetation present and whether the extent of the community had increased (+++, ++, +), decreased (---, --, -) or remained unchanged (0) from the original photographs.

The results of the visual evaluations for all 104 photosets are shown in Table 1.

Forest Communities

Fig. 1. Twin Basin area 1939-1994. (UTM 4930900 N 439250 E, Elevation 8,075 ft.).

Fig. 2. Upper Cottonwood Creek, Targhee National Forest 1917-1994. (UTM 4932850 N 424510 E, Elevation 7,920 ft.)

Willow Communities

Fig. 3. Twin Basin U.S. Sheep Experiment Station summer range 1939-1994. (UTM 4931800 N 438800E, Elevation 7,640 ft.)

Fig. 4. Miners Creek Targhee National Forest ca. 1910-1994. (UTM 4921700 N 405400 E, Elevation 6,320 ft.)

Sagebrush Community

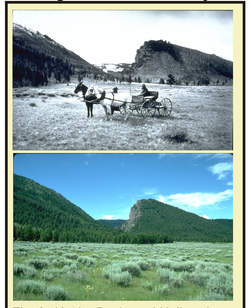

Fig. 9. Alaska Basin and Hellroaring Creek 1898-1995. (UTM 4938000 N 456400 E, Elevation 6,850 ft.)

Human Impact

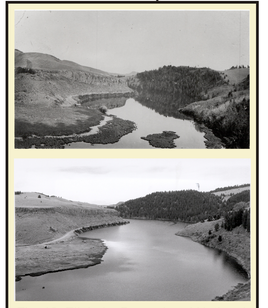

Fig. 10. Elk Lake Beaverhead National Forest ca. 1990-1997. (UTM 4945000 N 449550 E, Elevation 6,800 ft.)

Aspen Communities

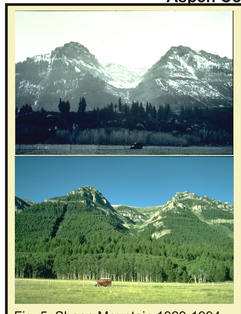

Fig. 5. Sheep Mountain 1929-1994. (UTM 4937700 N 443700 E, Elevation 6,660 ft.)

Fig. 6. Sheep Mountain 1895-1995. (UTM 4937300 N 438900 E, Elevation 6,700 ft.)

Tall Forb Communities

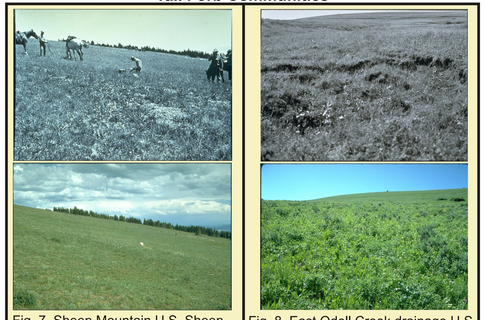

Fig. 7. Sheep Mountain U.S. Sheep Experiment Station summer range 1952-1994. (UTM 4934500 N 443850 E, Elevation 9,185 ft.)

Fig. 8. East Odell Creek drainage U.S. Sheep Experiment Station summer range 1960-1995. (UTM 49300700 N 437250 E, Elevation 7,700 ft.)

Results and Discussion

These repeat photosets indicate that there has been an increase in forested area in the Centennial Mountains while sagebrush and willow communities have remained relatively constant and the extent of aspen communities has declined (Table 1).

Several accounts suggest that fire was more frequent prior to European settlement. A decrease in the fire regime would have resulted in an increase in coniferous forests as shown in Figures 1 & 2 as well as decreased aspen regeneration. Figures 5 & 6 show an increase in the size and maturity of aspen trees which would be expected with lower fire occurrence. The increase in sagebrush (Fig. 9) would also suggest a higher historical fire regime.

Overgrazing by domestic livestock is a valid concern on many of the public lands in the Western United States. These photosets suggest that limited sheep grazing on the U.S. Sheep Experiment Station summer range has had little effect on the tall forb (Figs. 7 & 8) or on the willow communities (Fig. 3). Kay and Walker (1997) reported sheep grazing had little measurable effect on riparian habitats.

In some areas, human activities have had an impact on vegetative communities. Figure 10 shows the effect of damming an outlet on the level of Elk Lake in the Beaverhead National Forest.

Conclusions

Alterations in the fire regime probably had the largest impact on the vegetative communities in the Centennial Mountains. This has led to an increase in conifers and a decrease in aspen regeneration as well as reduced the extent of other communities. Dam building, overgrazing by livestock and wildlife has also effected the willow and other communities in some areas. Alterations in the fire regime needs to be considered when evaluating management strategies in these communities.

Table 1. Number of photosets in which various plant communities were depicted.

Vegetation Type	Total Community Depictions*	Vegetative Change – Number of depictions showing change						
		+++**	++	+	0	- - -	- -	-
Sagebrush	62	0	7	14	20	20	1	0
Forests	282	27	115	128	12	0	0	0
Aspen	62	0	0	6	10	23	17	6
Willows	73	2	2	11	46	12	0	0
Subalpine Meadows	48	0	0	0	13	29	4	2

*Number exceeds total photosets because some photographs had multiple communities represented in them. In these cases, each community response was considered separately.

** +++ indicated largest increase, 0 indicated unchanged and - - - indicated largest decrease.

Cited Reference

Kay, C.E. and J.W. Walker. 1997. A comparison of sheep and wildlife grazed willow communities in the Greater Yellowstone Ecosystem. Sheep Research Journal 13: 6-14.

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